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(54) An identification card and a method of producing it

(57) A multilayer identification card (1) in which information in the form of patterns, letters, numbers and/or pictures (2, 3, 4,, 6) is inscribed by means of a laser recorder in a layer (11) of the identification card which is made of plastics and is transparent in the visible spectral range. The material of this layer is adapted to the laser recorder in such a way that it absorbs the laser energy strongly enough in the wave range of the laser and thus transformations such as discoloration, microbubble information, etc., take place in the material, rendering the applied information very clearly visible and immune to falsification in the otherwise transparent layer. This layer may be protected by another plastics layer which is transparent both visually and for the laser recorder.

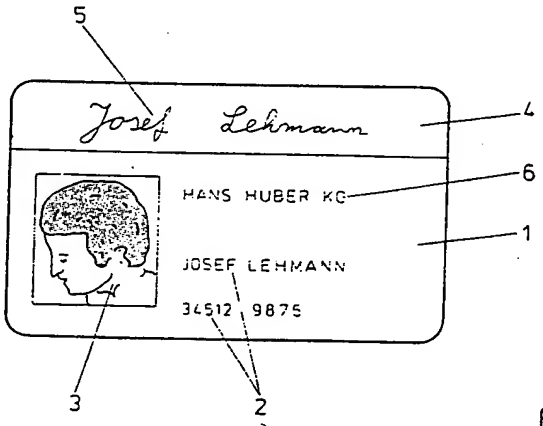

Fig. 1

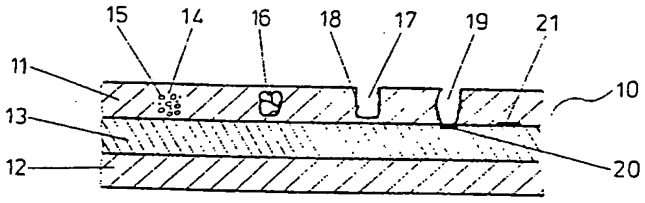

Fig. 2

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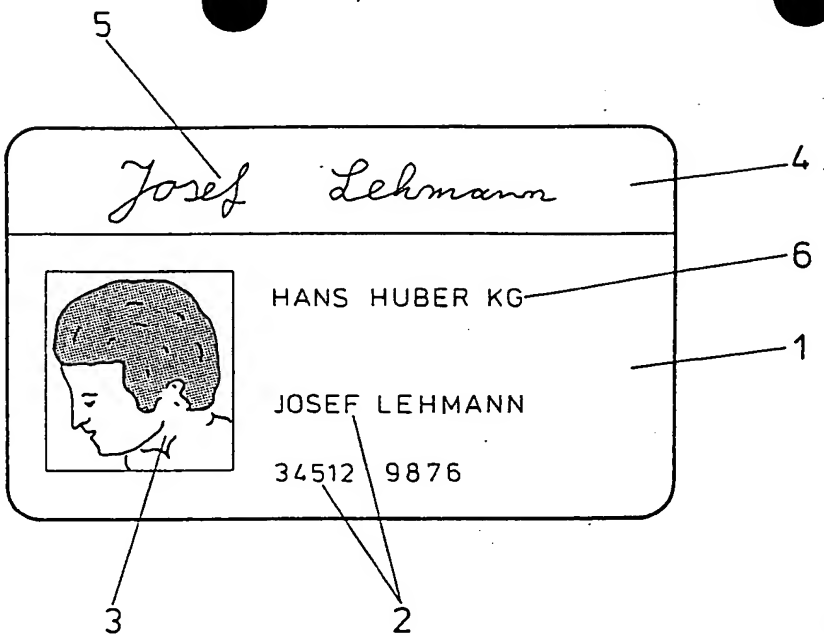

Fig. 1

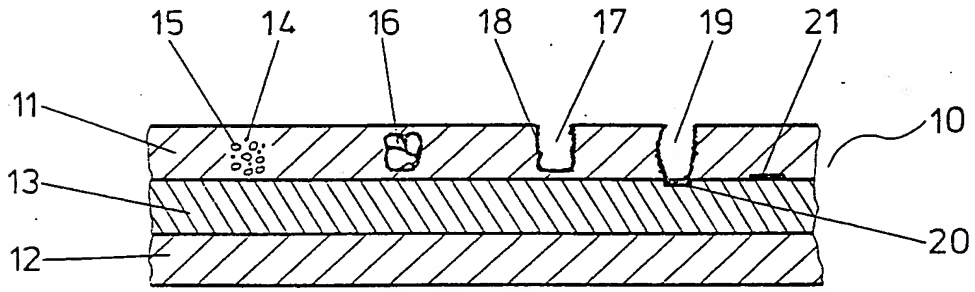

Fig. 2

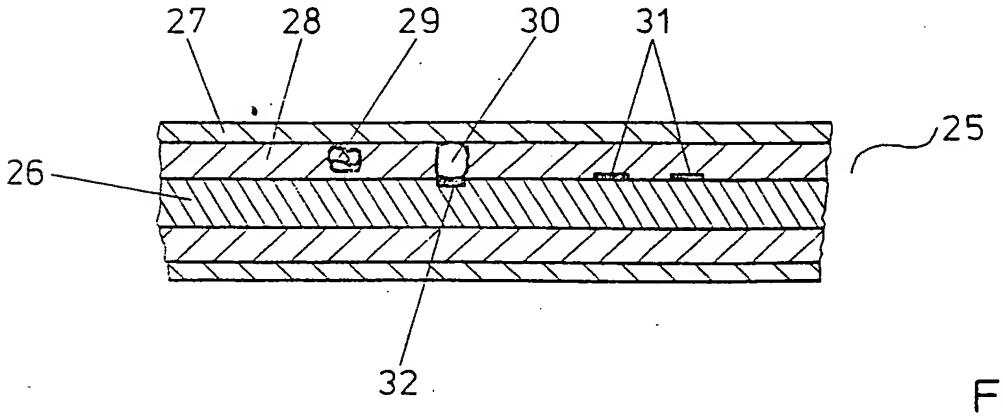

Fig. 3

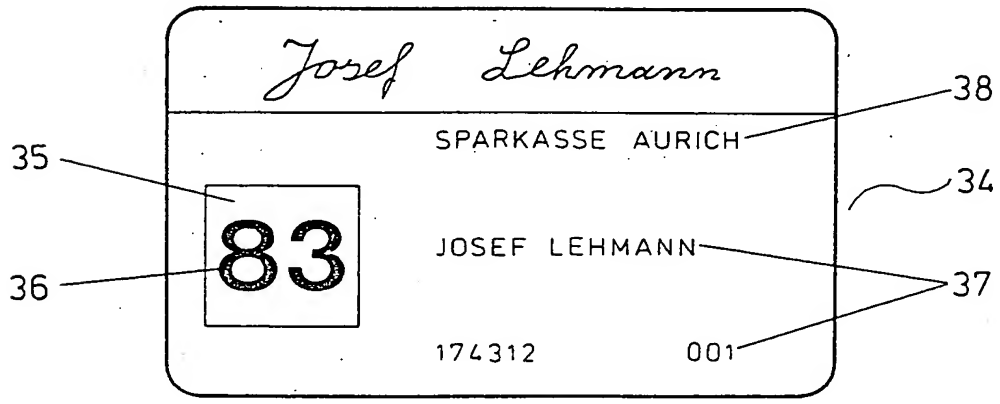

Fig. 4

SPECIFICATION

An identification card and a method of producing it

The invention relates to a multilayer identification card with information in the form of patterns, letters, numbers and/or pictures, applied by means of a laser recorder, as well as a method of producing such identification cards.

Identification cards in the form of credit cards, bank cards, cash payment cards and so on are increasingly used for cashless transfers in a great variety of service branches and also within enterprises. Due to their wide use, they are typical mass products, on the one hand - i.e. their production must be simple and inexpensive; on the other hand, they must be designed in such a way that they are protected against forgery and falsification to an extent as great as possible. The many kinds of identification cards already on the market or still in the development phase indicate the efforts of the relevant industry to optimize the two above-mentioned contrary conditions.

In particular, it is necessary to protect the data relating to the card owner, which are applied to the identification card during so-called "personaliation", in such a way that they cannot be subsequently manipulated. One possibility which has proved very useful in practice is to embed a paper inlay designed as a security print in a multilayer card. The paper inlay equipped with authenticity features such as watermarks, security threads, steel intaglio printing, etc., all used in the production of security documents, meets the highest standards of security and is protected against a great variety of types of attempted forgery and falsification, due to the protection of the data by means of transparent cover films.

Mainly because of their much more simple and inexpensive production, all-plastic identification cards are also used in the identification card branch. The security inlay is replaced by a simple dyed film or the identification card data and the general printing are applied to the outer surface of a small plastic card, which may possibly have a multilayer construction.

In spite of their economic advantages, such all-plastic identification cards have proved to be particularly unsuitable in that it is relatively easy to forge them due to their relatively simple construction, which is equipped with authenticity features only conditionally. The printing being directly accessible, the personalization data are exposed to any attempted falsification without much protection to speak of.

German patent no. 29 07 004, taking such aspects of security and production technology into consideration, disclosed an identification card with a card inlay of paper and a transparent cover film. The personal data are inscribed in the card inlay by means of a laser beam after lamination of the cover film. This information can be burned into the inlay or else be present in the form of a color change in a thermosensitive coating applied to the inlay.

Along with the advantage that this kind of identification card can have its construction completed before personalization and it is possible to provide such a completed, laminated card with the necessary information centrally or decentrally, this kind of identification card also offers a high degree of protection against attempted forgery and falsification, since its data are protected against direct access by the cover film.

If the personalization data are burned into the inlay, a so-called "translucent effect" is obtained depending on the intensity of the writing, i.e. the data are more or less clearly visible on the back of the identification card as well. This allows for verification of the personalization data in a particularly simple manner (tranmitted light testing from the back of the card). In various cases, however, this may be regarded as a disadvantage or undesirable due to a certain impairment of its visual appearance.

Since the information is burned into the paper inlay, the quality of the writing also depends on the superficial structure of the identification card material, which may be troublesome in the case of a very sturdy superificial structure.

The problem on which the invention is based is therefore to provide an identification card in which the above-mentioned advantages ar retained but any card cores of plastic or paper may be used, and the aspects possibly regarded as dis-advantageous in the use of paper inlays are avoided.

The problem is solved according to the invention by the features stated in the characterizing part of the main claim. Developments of the invention are stated in the subclaims.

An inventive identification card can thus contain a paper or plastic core which is laminated between two transparent cover films. The cover films may be single- or multilayer, although at least one layer of the film is made of a material which is transparent in the visible wave range and sufficiently absorbant in the wave range of the laser recorder. The cover film which is more or less transparent in the visible wave range, according to its thickness (the thin films conventionally used in laminating technology are completely transparent in their laminated state), should have, in the wave range of the laser recorder, a linear absorption coefficient which is only about a factor of one to two powers of ten greater than that of conventional cover films of comparable thickness without this absorptive behavior specifically adapted to laser recorders. General cover films are also transparent for the laser recorder, and are used as well in identification cards having paper inlays which are written on through the cover films.

In a development of the invention, if, for example, a more or less opaque or tinted appearance is intended for the identification card, the thickness of the film may be increased or the film material compounded with substances which bring about such an effect, e.g. small amounts of colored pigments. The tint or opaque effect may be controlled by these two parameters, the addition of pigments and the film thickness, up to the point that almost the entire transparency range is covered, i.e. identification cards can be produced in which the printing on the inlay is barely visible (almost opaque cover films) as well as identification cards in which it

is very clearly visible (completely transparent cover films). However, all embodiments have in common that the information exists in the form of local changes in the optical properties of the cover film, resulting from the local transformations in the cover film material caused by the laser beam. Depending on the dosage of laser beam energy, processes are triggered in the cover film whose exact chemical development has not yet been sufficiently researched. It is thought, however, that the specific transparent cover films made of hard PVC which particularly well absorb the light of an Nd laser working in the very near infrared, are locally transformed and partially destroyed in their material structure, in the course of which discoloration takes place due to gases, elementary carbon and other chemical reactors being released, which have not yet been examined more closely. When the dosage of laser energy is small, microscopically fine gas bubbles and black, microscopically small points presumably consisting of elementary carbon, first arise locally in the dye. At this stage the information is already visible ot the naked eye as a dim shadow. When the laser energy is increased, the gas formation and blackening in the film also increase until, at a certain laser energy depending on the properties of the film, a blackened channel consisting of more or less cohesive gas bubbles and clearly defined locally is formed in the film, closed off on the card surface side. At this stage the information is already very clearly visible. When the laser energy is increased further, the channels break open so that a blackened groove which opens onto the card surface is formed, on the edge and surface of which other color reactions are observed which may modify the overall color effect.

By varying the dosage of the laser energy and changing the "exposure time", all transitional steps between the above-mentioned stages may be selectively attained, each resulting in somewhat different overall appearance of the inscribed information. This method is characterized, however, by the especially fine, clearly marked and precise writing peculiar to all the inventive identification cards.

The protection against forgery may also be increased by burning the information into the inlay through the cover films, having chosen the film thickness and dosage of laser recorder energy in such a way that the information is present both in the cover film and on the inlay. In this way any attempted forgery which aims at detaching and exchanging the cover films, which is very difficult and hardly feasible anyway, is rendered utterly impossible.

A further advantage of the inventive method is that completely transparent areas can also be written on. In a special embodiment, for example, a window can be provided in the card core so that this area is completely transparent or, as mentioned above, more or less transparent or opaque after lamination. Information can then be inscribed in this window in the form of patterns, numbers, letters and/or pictures by means of a laser recorder. Since the writing produced in the cover films by means of laser recorders differs from other writing in its characteristic microstructure, one thus attains another authenticity feature which is easy to test visually, in addition to the fact that "laser data" are present in transparent film areas.

Further embodiments and details of the method shall be discussed in more detail with reference to the Figures listed below.

Figure 1 an inventive identification card from the top

Figure 2 a schematic view of an inventive identification card in cross-section

Figure 3 a schematic view of a further embodiment of an inventive identification card

Figure 4 further embodiments of an inventive identification card from the top

Figure 1 shows an inventive identification card 1 with personalization data 2, a photo 3, printing 6 on the paper or plastic inlay and a signature stripe 4 provided with a signature 5 applied by the card owner himself. While the company name 6 is preferably printed on the paper or plastic inlay, the prsonalization data 2 and possibly the photo 3 as well are inscribed by means of a laser recorder in the cover film which is transparent in the visible wave range but absorbant in the wave range of the laser recorder. The laser recorder used is an Nd YAG laser emitting in the very near infrared with a wavelength of 1064 nm.

A cover film suitable for this method is, for example, a hard PVC film termed ALKOR-PLAST CC-0-013 (called ALKOR film in the following) of the ALKOR Company of Munich, which has a linear absorption coefficient K at a thickness of 0.094 mm which at a wavelength of 1064 nm is approx. 15 times greater than a hard PVC film conventionally used in laminating technology, e.g. of the SICO-VINYL CC/L RU type of the Mazzuchelli Company of Varese, Italy, with a thickness of 0.283 mm.

As has been shown in experiments, the inventive reaction only comes about in the film above a certain threshold. This threshold can only be exceeded by relatively high laser beam energy which is only possible in continuous operation in the case of high-power lasers. The above-mentioned relatively inexpensive Nd YAG laser does not exhibit in continuous operation enough margin of power to overcome the power threshold. However, if the laser is operated in pulses to write on ALKOR films, the half-width value of a pulse being 200 ns and the power maximum of a pulse being around 20 kW, this threshold can be exceeded to obtain the inventive effects. The power maximum of a pulse can also be shifted up and down to obtain various effects which shall be described in more detail in the following.

Figure 2 shows a cross-section of an inventive multilayer identification card 10. The card inlay 13 made of plastic or designed as a security is laminated between two ALKOR films, cover films 11, 12. Whereas the general, card-independent information 21 is printed on the card inlay 13, the card-specific personalization data 2 (Figure 1) are produced by local changes in the optical properties of the cover film material resulting from characteristics material transformations 14; 15; 16; 17; 18; 19; 20 in the cover film material dependent upon the energy

dosage of the laser beam.

Different effects can be obtained selectively according to the dosage of laser energy. The reactions begin to snow-ball above a certain threshold. When the threshold is exceeded, microscopically fine bubbles 15 and microscopically fine black points 14 first form in the film, which are probably decomposition products of the PVC material, such as released gases and elementary carbon. The information is already visible to the naked eye at this stage as dim shadows in the cover film.

When the energy supply is increased, the bubble formation and blackening increase, and a clearly visible channel 16 is formed which is well marked locally and closed off on the card surface side and consists of more or less cohesive bubbles which are more or less blackened on their surfaces.

When the energy supply is increased further, channel 16 breaks open so that a channel 17 is formed which opens out onto the card surface and whose surface 18 scatters greatly and exhibits greatly blackened areas. The information is now not only very clearly visible in cover film 11 but can also be felt and tested by hand on the card surface.

If the energy supply is increased even further, cover film 11 is burned through, and not only a channel 19 penetrating cover film 11 is formed but also discolored areas 20 on the surface of card inlay 13, so that the information is present both in cover film 11 and on card inlay 13, which must be recognized as an additional increase in the protection of the information against foregery.

A further example of an inventive identification card is shown in Figure 3. A card inlay 26 designed as a security or made of plastic is laminated between two-layer cover films 27, 28. Layer 28 of the two-layer cover film is transparent in the visible wave range but is sufficiently absorbant for the laser recorder (e.g. an ALKOR film). Layer 27 is transparent both in the visual range and for the laser recorder.

When writing takes place by means of the laser recorder, its energy penetrates the transparent upper layer 27 practically unimpeded and enters layer 28 where it triggers the above-mentioned reactions depending on its dosage. The information is then present in the layer 28 in the form of closed off, blackened channels 29, 30, and is also fixed in card inlay 26 in the form of discolored areas 32 when the energy dosage is higher. The advantage of this embodiment is that the card surface with layer 27 is not affected by the laser beam so that the excellent surface quality of the PVC laminated films is retained.

Figure 4 shows a further embodiment of an inventive identification card. Identification card 34 exhibits, in addition to printing 38 on the card inlay and the information 37 applied inventively, a transparent display window 35 in which further information 36 is entered by means of the laser recorder.

Window 35 is produced, for example, by punching out a recess in the card inlay and filling it with a completely transparent, tinted or more or less opaque material, e.g. by inserting a piece of film of an appropriate size before lamination. The card inlay is then laminated between two cover films. The filler can be the same material as that of the cover films (e.g. an ALKOR film) or else a material not showing the inventive effect. When the card inlay is thin, one can do without filling up the punched out window 26 so that only the material of the cover films is found in this area after lamination.

As already mentioned above, cover films may also be used which are tinted by the addition of suitable substances or have an opaque appearance. It is only essential that they are absorbant in the wave range of the laser and are at least transparent enough in the visual spectral range that information or patterns underneath the cover films remain recognizable through the latter.

In a special embodiment, photo 3 in Figure 1 can also be produced in the cover film by means of the laser recorder. The photo is then formed by single scanning points which are "put into" the cover film by means of the laser recorder in the same way as the other individual personalization data are applied. The advantages of this method are particularly apparent in this case, since not only especially fine and clear printing, but also precisely defined, small and clean density points can be obtained in the cover film. Many other embodiments are conceivable which are also based on the basic idea of the invention, i.e. the application of information in the form of numbers, letters, patterns and photos in films of varying thickness and with different tints and degrees of opacity which are transparent in the visual range but absorbant in the wave range of the laser. Even a transparent identification card having a photo and information both applied in the inventive manner is conceivable within the scope of the invention.

CLAIMS

1. A multilayer indentification card with visible information in the form of patterns, letters, numbers and/or pictures, comprising a synthetic film which is transparent in the visible wave range but absorbant in the wave range of the laser recorder, the information being present in local changes in the optical properties of the synthetic film as a result of transformations in the material.

2. An identification card as in Claim 1, wherein the information is present congruently in the synthetic film and on a card inlay.

3. An identification card as in either Claim 1 or 2, wherein the synthetic film is absorbant in the wave range of an Nd YAG laser at a wavelength of 1064 nm.

4. An identification card as in claim 1, 2 or 3, wherein the synthetic film is present as a cover film of a multilayer laminate.

5. An identification card as in Claim 4, wherein a two-layer cover film is used which comprises the synthetic film and a further film of synthetic material which is transparent in both wave ranges.

6. An idenfication card as in Claim 5, wherein the synthetic film is directly adjacent to a paper inlay.

7. An identification card as in any preceding claim, wherein the local changes of the optical

properties result from gas bubbles and/or a greatly scattering inner surface and/or dicoloration in the synthetic film.

8. An identification card as in any one of claims 1 to 6, wherein the local changes of the optical properties result from channels which are closed off from the surface of the synthetic film and exhibit discoloration and more or less cohesive gas bubbles inside.

9. An identification card as in any one of Claims 1 to 6, wherein the local changes in the optical properties result from channels which open out onto the card surface and exhibit a greatly scattering surface and/or discoloration on the bottom and on the edges.

10. An identification card as in any preceding claim, wherein the synthetic film is tinted by the addition of color pigments or has a more or less opaque appearance.

11. An identification card as in any preceding claim, wherein the information is a grid technique photo applied by means of a laser recorder.

12. An identification card as in any preceding claim, wherein a transparent display window is provided in an opaque card inlay, and the synthetic film covering the window is inscribed with information by means of the laser recorder.

13. An identification constructed substantially as herein described with reference to Figures 1 and 2, or 3, or 4 of the accompanying drawings.

14. A method of producing an identification card as in Claim 3, wherein the information is applied by means of an Nd YAG laser recorder operated in pulses.

15. A method of producing an identification card, substantially as herein described with reference to the accompanying drawings.

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